

REMARKS

The Applicants thank the Examiner for carefully reviewing this application. Please reconsider the application in view of the above amendments and the following remarks.

I. Disposition of claims:

Claims 1-10 were pending in the application. New claim 11 has been added. Support for this new claim can be found in the specification, for example, on page 22, lines 20-25. Claim 1 is the only independent claim. Claim 1 has been amended to more clearly define the invention. Claim 6 has been amended to remove a typographical error. These amendments are not made for reasons related to patentability. No new matter has been introduced by these amendments.

II. Rejection under 35 U.S.C. § 112:

The Examiner rejected claim 6 for including polyether resin in the binder. In addition, the Examiner stated that “main component” is indefinite because it is unclear whether this is based upon weight, volume, or function.

The Applicants thank the Examiner for the careful review of the specification and the claims. Claim 6 has been amended to correct for the typographical error. Specifically, “polyether” resin has been changed to “polyester” resin. Support for this amendment is found in the specification, p. 6, lines 8-9. In addition, the “main component” has been changed to “main component by weight.” Throughout the specification, all components are described based on relative amounts by weight. No new matter has been introduced by way of these amendments. Withdrawal of this rejection is respectfully requested.

III. Claim Rejections under 35 U.S.C. §§ 102 and 103:

- (a) Claims 1-4 and 6-8 are rejected as being anticipated by, or in the alternative, obvious over U.S. Patent No. 5,928,990 issued to Guistina et al. ("Guistina et al."). To the extent that this rejection applies to the amended claims, it is respectfully traversed.

The present invention relates to recording sheets and methods for making the same. As shown in Figures 1a-1c, in one embodiment, a recording sheet 10 according to the invention includes a transparent substrate 11, an ink receptive layer 12 formed on the surface of the substrate 11, and an ink permeable layer 13 formed on the surface of the ink receptive layer 12. (Specification, p. 8, line 16 – p. 10, line 8; Figs. 1a-1c). With recording sheets of the invention, ink is applied on the surface of the ink permeable layer 13, not the ink receptive layer 12. The applied ink then travels through the ink permeable layer 13 to the ink receptive layer 12.

In some embodiments, the ink permeable layer 13 comprises a nonionic surfactant and a water-insoluble component. The water-insoluble component may comprise an inorganic filler and a binder. (Specification, p. 5, lines 18-25). The inorganic filler may be made of silica and the binder may include a polyester resin as a main component by weight. (Specification, p. 6, lines 1-9).

Advantageously, an ink permeable layer in accordance with the invention prevents ink from dispersing laterally in the ink permeable layer. As a result, there will be no smear in a printed image. (Specification, p. 22, lines 6-14). Consequently, a recording sheet of the present invention provides an improved print density and transparent image banding. (Specification, p. 12, Table 1). In addition, a dot printed on a recording sheet of the present invention has a smaller diameter and has a more consistent appearance when viewed from the

front or back of a transparent sheet, as compared to a dot printed on a conventional recording sheet. (Figs. 2-4).

Claim 1 of the present invention recites a recording sheet comprising a substrate; an ink receptive layer placed on the substrate for retaining ink; and an ink permeable layer placed on a surface of the ink receptive layer, through which the ink permeates to the ink receptive layer, the ink permeable layer comprising a nonionic surfactant and a water-insoluble component including an inorganic filler and a binder.

In contrast, Guistina et al. discloses a thermal dye transfer assemblage, wherein the receiver element contains a polyester polymer, and acidic metal salt and a certain surfactant, and the dye-donor element contains a deprotonated cationic dye. (Col. 1, lines 28-31). Conventional thermal dye transferred to a dye-receiving layer can migrate over time and degrade the printed image. (Col. 2, lines 3-5). The thermal dye transfer assemblage of Guistina et al. comprises a dye donor containing deprotonated cationic (uncharged) dye which is transferred to a receiver layer that includes an acidic metal to reprotonate the dye. The reprotonated (positively-charged) dye will not diffuse as readily in the receiver layer, which includes negatively-charged acid groups, and, hence, the image is less prone to degradation. (Col. 2, lines 50-55).

The dye receiving layer of Guistina et al. is prepared from an aqueous coating composition comprising a polyester and hydrated transition metal or metalloid salt of a strong acid. (Col. 7, lines 27-30). The hydrated transition metal or metalloid salt of a strong acid provides protons that protonate the cationic thermal transfer dye after the dye is transferred to the receiving layer.

Thermal dye printing sheets (such as those disclosed by Guistina et al.) are very different from the recording sheets of the present invention. First, thermal inks are hydrophobic, whereas the recording sheets of the present invention are for water-based inks. Furthermore, the dye receiving layer of Guistina et al. includes an acid. In contrast, the ink receptive layer of the present invention may comprise a chemical compound having at least one cationic group in its structure. The chemical compound having at least one cationic group may be a resin having at least one cationic group. (Specification, p. 6, lines 11-15). There is no need to include an acidic material in the ink receptive layer of the present invention to protonate the dye.

In addition, a recording sheet of Guistina et al. does not include an ink permeable layer. Thermal inks are directly applied onto the dye receiving layer of a thermal dye recording sheet of Guistina et al. In contrast, in accordance with embodiments of the present invention, inks are printed on the surface of an ink permeable layer (not an ink receptive layer), and then the applied inks travel through the ink permeable layer to the ink receptive layer.

Because Guistina et al. does not teach or suggest the limitations recited in claim 1, it cannot anticipate or render obvious the invention as recited in claim 1. Claims 2-4 and 6-8 depend from claim 1, and, therefore, are patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

(b) Claims 1, 2 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.

Patent No. 5,919,559 issued to Nakano et al. ("Nakano et al."). To the extent that this rejection applies to the amended claims, it is respectfully traversed.

Nakano et al. discloses a recording sheet comprising a substrate sheet and an ink-absorbing layer, provided on at least one face of the substrate sheet. The ink-absorbing layer

contains a water soluble resin or water dispersible resin and an ester group-possessing nonionic surfactant. (Abstract). The substrate is used as a support for the ink-absorbing layer. (Col. 2, lines 12-13). An intermediate layer comprising the water soluble resin or water dispersible resin and a polyhydric alcohol may be provided between the substrate sheet and the ink-absorbing layer. "The intermediate layer provides primarily an effect as an adhesive layer for the substrate and the ink-absorbing layer." (Col. 8, lines 30-38). Thus, a recording sheet according to Nakano et al. does not have an ink permeable layer on top of the ink-absorbing layer. Using such a recording sheet, inks are directly printed on the ink-absorbing layer. Furthermore, layers of such a recording sheet comprise water soluble or water dispersible resins.

In contrast, a recording sheet according to the present invention includes an ink permeable layer on a surface of the ink receptive (absorbing) layer. The ink permeable layer in accordance with the present invention comprises a water-insoluble component such that water-based ink droplets can pass through to reach the ink receptive layer. Using a recording sheet of the present invention, inks are printed on the surface of the ink permeable layer (not the ink receptive layer), and then the printed inks travel through the ink permeable layer to the ink receptive layer.

As noted above, claim 1 of the present invention recites a recording sheet comprising a substrate; an ink receptive layer placed on the substrate for retaining ink; and an ink permeable layer placed on a surface of the ink receptive layer, through which the ink permeates to the ink receptive layer, the ink permeable layer comprising a nonionic surfactant and a water-insoluble component including an inorganic filler and a binder.

Because Nakano et al. fails to teach or suggest the limitations as recited in claim 1, it cannot render claim 1 obvious. Claims 2 and 5-10 depend from claim 1, and, therefore, are

patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

New claim 11, which depends indirectly from claim 1, is patentable for at least the same reason.

Conclusion

The Applicants believe this reply to be fully responsive to all outstanding issues and to place this application in condition for allowance. If this belief is incorrect, or other issues arise, do not hesitate to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 03310.017001).

Respectfully submitted,

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APPENDIX A: MARKED-UP CLAIMS

Matter that has been removed from the claims is indicated in brackets and bold text, while matters inserted are underlined and in bold text.

1. (Amended) A recording sheet comprising:
a substrate;
an ink receptive layer **placed on the substrate** for retaining ink; **and**
an ink permeable layer placed on a surface of the ink receptive layer, through which the ink permeates to the ink receptive layer, the ink permeable layer comprising a nonionic surfactant and a water-insoluble component including an inorganic filler and a binder.

6. (Amended) The recording sheet according to claim 1, wherein the binder includes a **[polyether] polyester** resin as a main component **by weight**.